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Book Review

Nobel Laureate C V Raman's Work on Light Scattering : Historical Contributions to a Scientific Biography

by **Rajinder Singh**

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Chandrasekhar Venkata Raman, the only Indian Nobel laureate in physics, is a legendary figure in the history of Indian Science. No wander that a good number of biographies about different facets of this colorful physicist got published since 1920's. But most of them were devoted to eulogizing the brighter shades of his character – a successful mentor and good caretaker of his students. It is true that it was Prof. Raman's coworkers who established many research schools throughout undivided India. And single handedly Prof. Raman brought European scientific temper in Indian research. But most of the biographers tried to portray Raman as Indian brain as good as that of a person from western scientific community. Strangely enough, for a long period after independence, the subject 'Raman' as biographical sketch was almost ignored and the trend was reversed in 1970, after his death.

The author, Rajinder Singh in his thesis ventures to unravel the history about scientific practice and achievement, motivation of his work and about the unique way of sharing ideas with others. Many questions are asked by an inquisitive mind about this great scientist – the zeal behind his being a successful physicist and what were the instruments available to him, social and cultural factors behind his motivation and more importantly why he succeeded in discovering the light scattering effect, named after him while the western physicists failed. Especially, the controversy about not sharing the Nobel Prize with his co-worker and his long-drawn scientific debate with European scientific community is very important. Many of these were not answered in earlier works. Mr. Singh's thesis consisting of 8 chapters dwells on these aspects.

In the first chapter "The emergence of physics as an academic discipline in India" with a short history of inception of Indian Association for the Cultivation of Science (IACS), the author describes the advent of a part-time research worker to do research during his spare moments at IACS – a hitherto unknown place for basic research. Before 1907 when Raman came to IACS, lectures on different branches of science along with practical demonstration of experiments were offered by eminent teachers in Calcutta. Actually only a number of demonstration apparatus and a workshop to repair the instruments were at IACS before Raman came to do scientific research. During the period of 26 years at IACS, Raman published lots of papers on diverse topics in physics, made extension of existing library, became fellow of Royal Society and got the celebrated Nobel Prize in physics. Due to his highly independent mind, he had some conflict with other scientific personalities at Calcutta, which have been subtly described by the author. Though Prof. Raman brought laurels to IACS and himself still he had to have an ungraceful departure from Calcutta owing to continued opposition he created – a peculiar shade of his character.

Raman's early works on acoustics and others was good enough to be nominated for the Fellowship of the Royal Society of London. It is evident from the fact that his works on musical instruments done in twenties is still being referred in late nineties. Raman published a good number of papers in astronomy but surprisingly he did not continue much at IACS. He started again at the fag end of life to construct a small observatory as he considered the study of the heaven was the most elevating pursuit and also astronomy was a part of Indian cultural heritage. Raman's interest in light scattering was not to explain only the 'blue color of the sky' as popularly stated, but to throw some light on the problems of nature of liquid state and the anisotropic structure of atoms and molecules. He even published papers in support of quantum nature of light in response to Einstein's suggestion. All these are nicely deliberated in Chapter 2 entitled "Some of Raman's scientific achievements until the discovery of Raman effect".

Interesting historical details during the period of discovery of Raman effect *viz.* analysis of the first three

publications and newspaper announcement of the discovery *vis-à-vis* Krishnan's blow by blow account in his diary are very important to know for the generations to come. Initially, after the announcement of the effect, the western scientists were skeptical about the observation but later it was the German scientists coined the term as Raman effect for this unique discovery. Interestingly, the cost of the instrument used by Raman to discover the effect which bears his name is quoted differently by different authors; but it is sure that considering the exchange value, the spectrograph costed him to the tune of Rs. 228 only! Obviously, it was hard work, scientific conviction, scientific ideas and intuition that led to the discovery. Interesting details from K S Krishnan's diary regarding the effect and many historical backgrounds about the mechanism of the effect has nicely been described in Chapter 3 (The Raman effect – It's discovery, announcement and reception).

Being an Indian and Asia's first to receive the coveted Nobel Prize singly in physics from a colonial country is really something enigmatic, especially when Russian scientists recorded the same observation nearly at the same time. Another topic of discussion was there, that K S Krishnan should have been acknowledged as co-sharer of the honor of getting Nobel prize. These important issues have nicely been discussed in Chapter 4 (C V Raman and the Nobel prize for Physics in 1930). Probably, the quick way of publication and vast contact with the western scientific community played a crucial role in influencing the Nobel committee for the prize.

Though Raman was a scientist par excellence but he was also an uncompromising, dominating type, power seeking person. These all attributes led him to the disputes with colleagues on issues of several scientific institutions in India and abroad. The Chapters 5 and 6 "C V Raman : A controversial personality and a quarrelsome scientist Part I and Part II" discuss Raman's disputes with his Indian colleagues over the formation of Indian Academy of Sciences. The reasons behind his resignation from the Directorship of IIS have been well documented in Part I. Surprisingly, these disputes neither affected Raman's reputation as a man nor his scientific achievements at that time. Part II (Chapter 6) deals with main scientific controversies with British and German physicists. The author has beautifully unfolded the well-known Born-Raman lattice dynamics controversy based on memoirs of different physicists.

It is true that Raman had extensive contacts with western scientists in relation to his research, as well as there were conflicts and controversies with the Western counterpart. There is hardly any parallel example of Indian scientists till now, who dared to counter and establish his work with scientists abroad. He even resigned from the fellowship of the Royal Society after long being associated with the institution. The author discusses these points quoting Raman's personal letters to various persons and also newspaper clippings. It is quite easy reading down the memory lane in Chapter 7 (Raman's contacts with scientists abroad), all the happenings during that time.

In a period when research in India was a new thing, it is very curious to know about Raman's style or methodology to be a successful physicist. He was very strong both in theory and experiment. But he always thought that "theories must stand or fall according to as they agree with the facts, and not *vice-versa*". In Chapter 8 (Raman's research style), the author has discussed them elaborately and these should be the good starting point for future generation researchers.

Raman was an uncompromising, dominant, power seeking and also an intuitive scientist. The author has portrayed Sir Raman not as a legend but as a scientist having a complex personality with critical and objective approach. The reviewer strongly believes that it is the aggressive and uncompromising qualities of his character which helped him in getting the coveted Nobel prize, working in a not-so-equipped laboratory and competing with scientists from western countries working towards the same goal.

The language of the book does not seem to be very lucid, and indeed, is full of spelling mistakes. The fact about Raman as 'bank officer' is not correct; rather he was with Indian Finance Department. Spelling mistakes of some prominent persons' names may give wrong impression to the readers. It is expected that in future edition, all these would properly be rectified. Also the enlarged font size would help in a strain-free reading.

Everybody should be aware of Raman's scientific temperament and disciplined approach, which made him great. The author has done a good job of compilation after sifting newspaper clippings, personal letters, and diaries relating to Sir Raman from different parts of the world. The book is worth having in science libraries and also in the personal collection.

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